Images in Cardiovascular Medicine

The "Normothermic" Osborn Wave Induced by Severe Hypercalcemia

Javier Otero, MD
Daniel J. Lenihan, MD

In February 1999, a 33-year-old man with no significant medical history was admitted to our institution for notable weight loss and changes in mental status, both of which had occurred over the past several days. He was found to be hypercalcemic: his serum calcium level was 16.3 mg/dL (normal, 8.6 to 10.6 mg/dL) and ionized calcium was 10.29 mg/dL (serum pH, 7.39). Intact parathyroid hormone was 661.9 pg/mL (normal, 10 to 65 pg/mL). A routine electrocardiogram showed classic Osborn waves (Fig. 1). A diagnosis of parathyroid adenoma was confirmed by pathologic analysis.

The electrocardiographic J wave has been associated with hypothermia since the early studies by Osborn[1] and is typically referred to as an Osborn wave. Several subsequent reports have suggested that conditions other than hypothermia may also produce this electrical phenomenon. A 1994 review by Patel and colleagues[2] reported 8 cases of an Osborn wave under normothermia, in the settings of acute ischemic events, cocaine use, haloperidol overdose, and left ventricular hypertrophy due to hypertension. Previous reports documented this phenomenon after cardiac resuscitation,[3] and in association with hypercalcemia,[4,5] cardiac ischemic events, and central nervous system injury.[6] The Osborn wave has been observed at core temperatures of 35.6 °C, but it becomes more prominent at lower temperatures.[7]

Our patient had no evidence of ischemia, he had not used drugs recently, and he was normothermic. The only abnormality that could explain the Osborn wave was his severe hypercalcemia due to parathyroid adenoma. Once the patient's calcium level returned to normal, the electrocardiographic recording also became normal (Fig. 2).

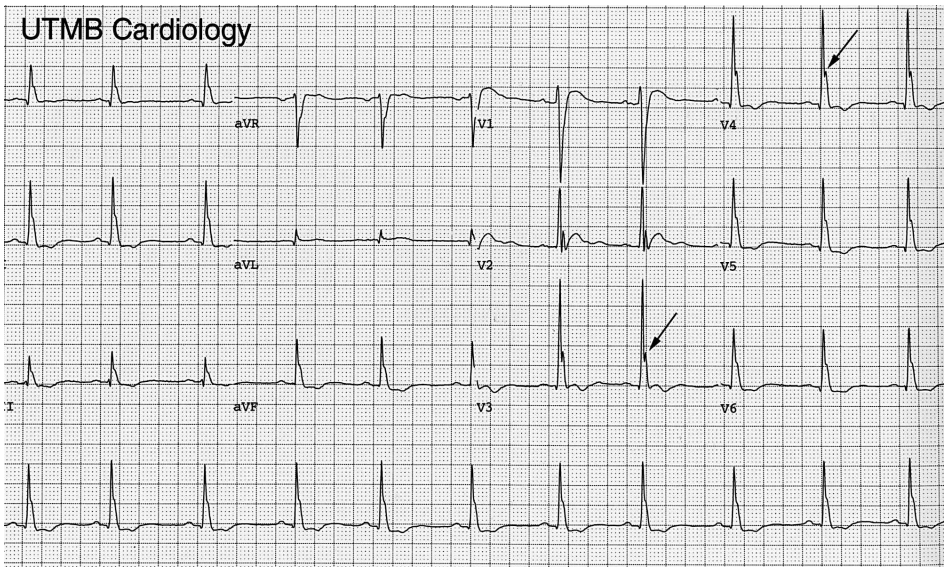

Fig. 1 *Electrocardiographic readings show the Osborn waves (arrows) in our severely hypercalcemic patient.*

From: *The Division of Cardiology, University of Texas Medical Branch at Galveston, Galveston, Texas*

Address for reprints:
Daniel J. Lenihan, MD, 301 University Blvd., 5.106 John Sealy Annex, Galveston, TX 77555-0553

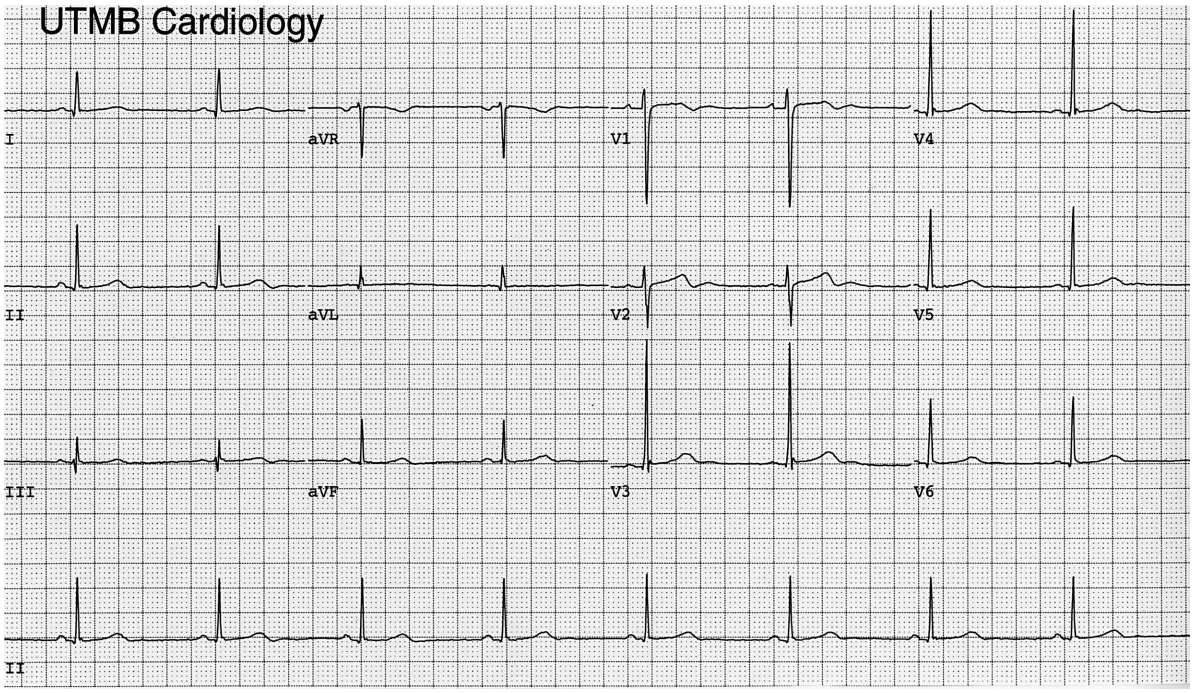

Fig. 2 *After correction of the hypercalcemia, the electrocardiogram was normal.*

References

1. Osborn JJ. Experimental hypothermia: respiratory and blood pH changes in relation to cardiac function. Am J Physiol 1953;175:389-98.
2. Patel A, Getsos JP, Moussa G, Damato AN. The Osborn wave of hypothermia in normothermic patients. Clin Cardiol 1994;17:273-6.
3. Jain U, Wallis DE, Shah K, Blakeman BM, Moran JF. Electrocardiographic J waves after resuscitation from cardiac arrest. Chest 1990;98:1294-6.
4. Jenkins JK, Best TR, Nicks SA, Murphy FY, Bussel KL, Vesely DL. Milk-alkali syndrome with a serum calcium level of 22 mg/dl and J waves on the ECG. South Med J 1987;80:1444-9.
5. Sridharan MR, Horan LG, Electrocardiographic J wave of hypercalcemia. Am J Cardiol 1984;54:672-3.
6. Abbott JA, Cheitlin MD. The nonspecific camel-hump sign. JAMA 1976;235:413-4.
7. Thompson R, Rich J, Chmelik F, Nelson W. Evolutionary changes in the electrocardiogram of severe progressive hypothermia. J Electrocardiol 1977;10:67-70.